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4      Title:                         Valley Truss Uplift Resistance Strap With Wedge and Method of Use  
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9                                    CLEAN COPY of the BRIEF DESCRIPTION OF THE DRAWINGS section and the  
10                                   DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS section of the Specification  
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12                                    BRIEF DESCRIPTION OF THE DRAWINGS

13      Fig. 1 is perspective view of a first embodiment of the present invention having a planar base  
14      member, a web member upwardly extending from the base member at an acute angle, a wedge  
15      positioned within the acute angle, and a plurality of fastener holes through the web member and  
16      the opposing ends of the base member.

17      Fig. 2 is a front view of two first embodiment uplift resistance straps attached between a  
18      manufactured valley truss and two standard manufactured wood roof trusses supporting it.

19      Fig. 3 is a perspective view of the first embodiment connected between a vertically extending  
20      piece of construction material with a non-beveled bottom end, and the top chord of a standard  
21      manufactured wood roof truss.

22      Fig. 4 is a perspective view of the first embodiment connected between a non-beveled  
23      horizontally extending bottom chord of a manufactured valley truss and the top chord of a  
24      standard manufactured wood roof truss.

25      Fig. 5 is a top view of a second embodiment of the present invention in a substantially flat,  
26      unfolded condition.

27      Fig. 6 is a top view of the second embodiment in a partially folded condition.

28      Fig. 7 is also a top view of the second embodiment in a partially folded condition.

29      Fig. 8 is also a top view of the second embodiment in a partially folded condition.

30      Fig. 9 is a top view of the second embodiment in a nearly complete folded condition.

- 1 Fig. 10 is a top view of a third embodiment of the present invention in a substantially flat.
- 2 unfolded condition.
- 3 Fig. 11 is a top view of the third embodiment in a partially folded condition.
- 4 Fig. 12 is a top view of the third embodiment in a nearly complete folded condition.
- 5 Fig. 13 is a perspective view of a fourth embodiment of the present invention in a partially folded
- 6 condition.
- 7 Fig. 14 is a perspective view of the fourth embodiment in a nearly complete folded condition.
- 8 Fig. 15 is a perspective view of the fourth embodiment in its completely folded condition ready
- 9 for use.
- 10 Fig. 16 is a top view of the fourth embodiment in a substantially flat, unfolded condition.
- 11 Fig. 17 is a perspective view of the fourth embodiment connected between a vertically extending
- 12 piece of construction material with a non-beveled bottom end, and the top chord of a standard
- 13 manufactured wood roof truss.
- 14 Fig. 18 is a perspective view of the forth embodiment connected between a non-beveled
- 15 horizontally extending bottom chord of a manufactured valley truss and the top chord of a
- 16 standard manufactured wood roof truss.
- 17 Fig. 19 is a side view of the fourth embodiment having a nail inserted through the lower portion
- 18 of the web member, the wedge, and the base member.
- 19 Fig. 20 is a perspective view of a several present invention uplift resistance straps each connected
- 20 between the horizontally extending bottom chord of a manufactured valley truss and the top
- 21 chord of a standard manufactured wood roof truss.
- 22 Fig. 21 is a perspective view of two perpendicularly oriented roof structures having a valley
- 23 therebetween in which the present invention could be used to provide uplift resistance.
- 24 Fig. 22 is a perspective view of a fifth embodiment of the present invention having a molded
- 25 construction

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3 DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

4       The present invention provides uplift resistance to roof construction where valleys occur,  
5 two examples of which are shown in Figs. 20 and 21. Fig. 20 shows the construction of what  
6 could be a small porch roof connected to a larger roof structure behind it, with the standard roof  
7 trusses 18 below bearing perpendicular to the overlaying porch trusses 16. This overlap of roof  
8 and porch trusses, to fill in the roof plane, creates a valley. In contrast, Fig. 21 shows two full  
9 roof structures connected to one another in a T-shaped configuration. The fill area where the  
10 roof structures overlap and a set of roof trusses 18 below bear perpendicular to a second  
11 overlaying set of roof trusses 16, also comprises a valley. In addition to uplift resistance, the  
12 present invention would also provide a built-in wedge configured to level the overlaying valley  
13 trusses, without a need for beveling the bottom chord of each valley truss or a need for the time-  
14 consuming on-site manufacture and installation of stand-alone wedges that allow a solid  
15 connection between supported valley trusses 16 and the sloping top chords of the standard roof  
16 trusses 18 beneath them. Further, the present would replace an elongated prior art tie-down strap  
17 that must be attached to adjoining trusses through a hole made on-site in the roof sheathing  
18 adjacent to the truss intersection. Thus, connection of the elongated prior art tie-down straps is  
19 accomplished in a separate step following the step of attaching the valley truss to underlying  
20 standard roof trusses. Further, installation of the elongated tie-down strap typically requires two  
21 people, with one person positioned above the roof plane to connect the upper portion of the  
22 elongated tie-down strap to the valley truss and another person below the roof plane to connect  
23 the lower portion of the elongated tie-down strap to the standard roof truss, or the same person to  
24 sequentially perform the upper and lower tie-down strap connections. In contrast, installation of  
25 the present invention is faster as it is used directly in the connection of a valley truss to each of  
26 the standard roof trusses supporting it, so that connection, leveling, and uplift resistance

1 requirements are all satisfied in a single installation step. The present invention, already having a  
2 pre-formed wedge incorporated therein, also eliminates a need for additional steps involving the  
3 creation and connection of a stand-alone wedge or subsequent tie-down connection at each  
4 intersection of a manufactured valley truss to a standard manufactured wood roof truss. It is  
5 contemplated for the present invention to be made of rigid materials and have a unitary  
6 construction. However, the present invention can be made from plastic, nylon and other  
7 materials formed through molded construction, or in the alternative made from a stamped piece  
8 of rigid material, preferably galvanized steel, that is pre-formed into the approximate  
9 configuration shown in Fig. 1. The wedge of the present invention, pre-formed at a designated  
10 angle appropriate to the slope of the top chord in each of the underlying standard roof trusses  
11 with which it is contemplated for use, provides leveling for an overlaying valley truss without the  
12 costly, labor-intensive process of beveling the bottom surface of each valley truss, either during  
13 manufacture or on-site, or the creation and connection of stand-alone wedges that are connected  
14 between the bottom chord of a valley truss and the top chord of each standard roof truss  
15 supporting it. The wedge can be solid or hollow, depending upon the materials used for its  
16 construction. Further, since holes are pre-formed through the upwardly extending web member  
17 and the base member of the present invention, an installer is not confronted with the additional  
18 time delays resulting from replacement of wooden wedges that split or crack during fastener  
19 attachment.

20 Fig. 1 shows a first embodiment 2 of the present invention having a planar base member  
21 with a first end 4 and a second end 6, and a web member 10 upwardly extending from second end  
22 6 to form an acute angle 12 relative to first end 4. Although web member 10 appears to have  
23 approximately the same length dimension as first end 4 and second end 6, web member 10 could  
24 be shorter or longer than first end 4 and second end 6, with the length of web member 10 being  
25 determined by the governing uplift resistance code requirement. An embodiment where second  
26 end 6 is shorter than web member 10 and first end 4 has been omitted, is shown in Fig. 15. Fig. 1

1 also shows a wedge 8 positioned within acute angle 12, and connected between first end 4 and  
2 web member 10. The height of the taller end of wedge 8 would vary according to different pitch  
3 applications. Also, although not limited thereto, the upper surface of wedge 8, which provides  
4 the seat area for an overlaying valley truss 16, would preferably have a minimum surface area of  
5 approximately one-and-one-half square inches. Fig. 1 further shows two fastener holes 14 in web  
6 member 10, two fastener holes 14 in second end 6, and one fastener hole 14 in first end 4. The  
7 number, size, spaced-apart distance, alignment, and configuration of fastener holes 14 are not  
8 critical, and at a minimum would be sufficient to meet nailing and uplift resistance requirements  
9 of the local or regional building code. Fig. 1 also shows the distal ends of first end 4, second end  
10 6, and web member 10, each being substantially rectangular in configuration and having  
11 chamfered edges to help resist bending the could otherwise occur from uplift. In addition to the  
12 configuration of corners appearing to be cut off at an approximate 45° angle, it is considered to be  
13 within the scope of the present invention for the distal ends of first end 4, second end 6, and web  
14 member 10, to also have the rounded configuration shown in Figs. 5-9, or other linear, arcuate, or  
15 curvilinear configuration. It is contemplated that first embodiment 2 would be made from  
16 molded construction, using metal, plastic, nylon, or any other material permitted by code. One  
17 preferred plastic material is polycarbonate. Also, although not limited thereto and only provided  
18 as an example, it is contemplated that the length dimension of first embodiment 2, from the distal  
19 end of first end 4 to the distal end of second end 6, would be a minimum of approximately four  
20 inches and a maximum of approximately twelve inches. The first embodiment shown in Fig. 1  
21 could represent either a molded or folded uplift resistance strap. The taller end of wedge 8,  
22 which is shown in Fig. 1 in a position facing second end 6, has an open configuration expected in  
23 folded embodiments formed from the unfolded stamped configurations of second embodiment 24  
24 and third embodiment 26, shown in Figs. 5 and 10, respectively, the vertical support for wedge 8  
25 being derived from its rigid side structures. In contrast, the embodiments of the present invention  
26 made through molded construction could either have a solid wedge 8, or a hollow wedge 8

1 similar to that shown in Fig. 1.

2 Fig. 2 shows first embodiment 2 attached between the bottom chord of a valley truss 16  
3 and the top chord of a standard roof truss 18 supporting it. Although two first embodiment 2  
4 attachments are shown, the number of first embodiments 2 connected between valley truss 16  
5 and standard roof trusses 18 would be determined by code. The upstanding web member 10 in  
6 each first embodiment 2 is connected to the downwardly facing side of a supported valley truss  
7 16 through fasteners (not shown) inserted through fastener holes 14, while the second end 6 of  
8 each first embodiment 2 is connected to the top cord of the standard roof truss 18 supporting the  
9 same valley truss 16, also via a fastener (not shown) inserted through each fastener hole 14  
10 present in the planar base member of first embodiment 2, which includes second end 6 and first  
11 end 4 (not visible in Fig. 2). When the present invention is relied upon to provide a wedge 8 for  
12 non-beveled trusses 16, one first embodiment 2 would become connected at every intersection of  
13 valley truss 16 to standard roof trusses 18. As shown in Fig. 2 and mentioned above, the uplift  
14 resistance straps of first embodiment 2 are only secured on the side of valley truss 16 that is  
15 facing the downward sloping ends of the standard roof trusses 18 supporting it.

16 Fig. 3 shows first embodiment 2 connected between a vertically extending piece of  
17 construction material 20 with a non-beveled bottom end 22, and the top chord of a standard roof  
18 truss 18. Fig. 3 shows second end 6 attached to the portion of standard roof truss 18 in a  
19 position downwardly extending below construction material 20, and web member 10 attached to  
20 the side of construction material 20 that faces the downwardly extending end of standard roof  
21 truss 18 supporting it. Fig. 3 further shows the non-beveled bottom end 22 of construction  
22 material 20 supported in a substantially level position upon wedge 8, and first end 4 positioned  
23 against the top chord of the portion of standard roof truss 18 upwardly extending beyond  
24 construction material 20.

25 Fig. 4 shows first embodiment 2 connected between a horizontally extending bottom  
26 chord of a manufactured valley truss 16 and the top chord of a standard roof truss 18. As shown

1 in Fig. 4, first embodiment 2 is only secured to valley truss 16 via web member 10, and only on  
2 the vertical side of valley truss 16 that is facing the downwardly extending ends of standard roof  
3 trusses 18. Connection between first embodiment 2 and the top chord of a standard roof truss 18  
4 is accomplished via the planar base member of first embodiment 2, which comprises second end  
5 6 and first end 4. This is in contrast to the fourth embodiment 32 shown in Fig. 19, wherein the  
6 bottommost fastener hole 14b in web member 10 is used in part to attach web member 10 to the  
7 top chord of the supporting standard roof truss 18. In Fig. 4, second end 6 is placed in a position  
8 adjacent to valley truss 16 and downwardly extending from valley truss 16 with fasteners inserted  
9 through fasteners holes 14 and secured between first embodiment 2 and standard roof truss 18,  
10 while first end 4 is placed in a position adjacent to valley truss 16 and upwardly extending  
11 therefrom, also being secured by fasteners inserted through fasteners holes 14. As shown in Fig.  
12 4, wedge 8 is positioned under the bottom chord of valley truss 16. The degree of incline  
13 provided by wedge 8 can be varied during manufacture, to accommodate a difference in roof  
14 pitch. Also, although not critical, Fig. 4 shows first end 4 and second end 6 extending the full  
15 width of standard roof truss 18. The width and thickness dimensions of first end 4, second end 6,  
16 and web member 10 can vary, so as to allow a balance between the need for cost-efficient  
17 construction and compliance with the governing code requirements. The relative dimensions of  
18 first end 4, second end 6, and web member 10 can also vary, as can the number and positioning  
19 of fastener hole 14 therethrough. Also, although steel and selected plastics, such as  
20 polycarbonate, are preferred for the manufacture of first embodiment 2, other materials can be  
21 used as long as they meet the necessary strength requirements to satisfy the governing uplift  
22 resistance code.

23 Figs. 5-9 show a second embodiment 24 of the present invention in an unfolded  
24 condition, and various phases of folding. In Figs. 5-9 the distal perimeter of first ends 4A and  
25 4B, second ends 6A and 6B, as well as web member 10 are shown to have a rounded  
26 configuration. Although a blunt perimeter is favored for safety considerations to avoid injury,

1 other perimeter configurations are also considered to be within the scope of the present invention.  
2 such as a rectangular configuration and the rectangle with chamfered ends shown in Figs. 10-12  
3 for web 10, first side 4 and second side 6, wherein the corners of are all cut off at an approximate  
4 45° angle. Fig. 5 shows second embodiment 24 in a substantially flat, unfolded condition. The  
5 arrows above web member 10 show that as the second embodiment 24 takes its final form, web  
6 member 10 would be moved rearwardly and away from second ends 6A and 6B. The arrows  
7 adjacent to second ends 6A and 6B, show that as the second embodiment 24 takes its final form,  
8 second ends 6A and 6B would each be moved forwardly and toward one another. Figs. 6, 7, and  
9 8 show second embodiment 24 in a partially folded condition, with each successively higher  
10 numbered illustration showing second embodiment 24 progressively closer to its usable  
11 configuration, while Fig. 9 shows second embodiment 24 in a nearly complete folded condition.  
12 Fig. 6 shows second ends 6A and 6B closer together than in Fig. 5, with web member 10 more  
13 rearwardly positioned than in Fig. 5. Fig. 7 shows second end 6B being inwardly folded and  
14 rotated approximately 180° from its original pre-folded position, with second end 6B being  
15 poised for a similar 180° inwardly folded rotation. Although second end 6B is shown undergoing  
16 the 180° rotation first, the order of such rotation is not critical. Fig. 8 shows both second ends 6A  
17 and 6B after undergoing a near 180° rotation, but not yet aligned with one another as they would  
18 be when second embodiment 24 has reached its final configuration. Fig. 10 shows second end  
19 6B and first end 4B aligned with web member 10, with second end 6A and first end 4A needing  
20 approximately 90° more rotation for second embodiment 24 to reach its usable configuration,  
21 similar to that shown in Fig. 1. When folding is complete, wedge 8 in second embodiment 24  
22 would have the same hollow configuration shown in Fig. 1. It is contemplated for second  
23 embodiment 24 to be made from rigid material, such as steel, plastic, or nylon, and have a  
24 substantially uniform thickness.

25 Figs. 10, 11, and 12 respectively show a third embodiment 26 of the present invention in  
26 a substantially flat unfolded condition, an intermediate folded condition, and a nearly complete

1 folded condition. It is contemplated for third embodiment 26 to be made from rigid material,  
2 such as steel, nylon, or plastic, and have a substantially uniform thickness. Figs. 10-12 further  
3 show the planar base member having first end 4 and second end 6, and web member 10 all of  
4 similar length and width dimension, each as being substantially rectangular with chamfered distal  
5 ends, wherein the corners are all cut off at an approximate 45° angle. Fig. 10 shows third  
6 embodiment 26 in a substantially flattened condition, prior to folding. In Fig. 11, the arrows  
7 above web member 10 show that as the third embodiment 26 takes its final form, web member  
8 10 would be moved rearwardly and away from wedge 8. The arrows adjacent to second end 6  
9 and first end 4, show that as the third embodiment 26 takes its final form, second end 6 and first  
10 end 4 would each be moved forwardly and toward one another. Fig. 12 shows that first end 4  
11 and second end 6 also undergo an approximate 180° rotation relative to their original pre-folded  
12 conditions, prior to the third embodiment 26 reaching its usable configuration. Either second end  
13 6 or first end 4 can be folded in advance of the other, or both can be folded at once since there is  
14 no overlap of one member relative to the other similar to that occurring in the folding of second  
15 embodiment 24. Fig. 12 shows second end 6 and first end 4 almost aligned with one another as  
16 they would be when third embodiment 26 has reached its final configuration, similar to that  
17 shown in Fig. 1, with third embodiment 26 having a hollow wedge 8. The adjoining surfaces of  
18 first end 4 and second end 6, which extend diagonally and form the bottom surface of wedge 8,  
19 can be bonded or welded to one another during manufacture, if needed to satisfy the governing  
20 code requirements.

21 Figs. 13-19 show a fourth embodiment 32 of the present invention in an unfolded  
22 condition, and various phases of folding, as well as in positions of use. Figs 13 and 14 show  
23 fourth embodiment 32 in partially folded conditions, while Fig. 16 shows fourth embodiment 32  
24 in a substantially flat, unfolded condition and Fig. 15 shows fourth embodiment 32 in its  
25 completely folded condition ready for use. Fig. 15 shows the present invention having an  
26 upstanding web member 10, a hollow wedge 8 having an upper surface 28 extending forwardly

1 from web member 10, a rearwardly extending second end 6, and several fastener holes 14.  
2 Second end 6 is significantly shorter than web member 10, and in fourth embodiment 32 no first  
3 end 4 is present. Another difference in fourth embodiment 32 is that wedge 8 has a vertical back  
4 wall containing fastener hole 14b1, instead of the laterally positioned walls shown in Fig. 1. A  
5 further difference between fourth embodiment 32 and the other illustrated embodiments of the  
6 present invention is that fourth embodiment 32 contains fastener holes 14b, 14c, 14b1, and 14c1,  
7 which collectively allow a fastener, such as fastener 34 in Fig. 19, to be secured through wedge 8.  
8 Although not limited thereto, Fig. 15 shows three fastener holes 14 through web member 10,  
9 with the upper holes being offset from one another as well as from the laterally centered bottom  
10 fastener holes 14. While the angle 12 between upper wedge surface 28 and web member 10 is  
11 shown in Fig. 15 to be approximately 90°, the intersection between the bottom surface of wedge  
12 8 and web member 10 typically represents an acute angle more pronounced than illustrated. Fig.  
13 16 shows fourth embodiment 32 in its flattened, unfolded condition. Moving from left to right in  
14 the illustration of unfolded fourth embodiment 32 in Fig. 16, one first encounters web member  
15 10 with three fastener holes, the bottommost of which is designated by the number 14b. To the  
16 right of web member 10, one next encounters rearwardly extending second end 6, with one  
17 centrally positioned fastener hole 14a. The bottom surface 30 of fourth embodiment 32 is  
18 situated to the right of rearwardly extending second end 6 and contains two fastener holes 14a1  
19 and 14c. The upper surface of wedge 8 extends to the right of bottom surface 30 and has no  
20 fasteners holes 14. The remaining two sections of fourth embodiment 32 having centered  
21 fastener holes 14b1 and 14c1 are unnumbered and are reinforcement members for wedge 8, the  
22 one which contains fastener hole 14b1 forming a vertically extending back wall of wedge 8  
23 during use. Thus, when fully formed, the structure of wedge 8 in the fourth embodiment would  
24 comprise open sides, a double layer of vertical support at its taller end, a partially doubled bottom  
25 surface 30, and aligned fastener holes 14b, 14b1, 14c, and 14c1 that would allow a fastener, such  
26 as fastener 34 in Fig. 19 to pass through both layers at the taller end of wedge 8, exit through

1 both layers forming the bottom surface 30 of wedge 8, and enter the top chord of the standard  
2 roof truss 18 upon which the fourth embodiment 32 is supported during use. To fold fourth  
3 embodiment 32 into its usable configuration, the lower end of web member 10 is brought into  
4 contact with bottom surface 30 so that fastener holes 14a and 14a1 become aligned to form  
5 second end 6. As this occurs, rearwardly extending second end 6 becomes superimposed upon a  
6 portion of bottom surface 30. In a separate step, the opposing end on fourth embodiment 32 is  
7 folded to form wedge 8, with fastener hole 14b1 becoming aligned with fastener hole 14b in the  
8 lower end of web member 10, and fastener hole 14c1 becoming aligned with fastener hole 14c in  
9 bottom surface 30. Arrows in Figs. 13 and 14 show the directions of folding. Thus, it is  
10 contemplated for four fasteners, such as fastener 34 in Fig. 19 that is configured as a nail, to be  
11 used for securing fourth embodiment 32 in place during use. A first fastener 34 would extend  
12 through two fastener holes, 14a and 14a1 to connect second end 6 to the downwardly extending  
13 portion of the top chord of a standard roof truss 18. A second fastener 34 would extend through  
14 two fastener holes, 14b and 14b1, further extend through wedge 8, and then finally through two  
15 additional fastener holes, 14c1 and 14c to connect web member 10 and wedge 8 to the top chord  
16 of the same standard roof truss 18. The final two nails 34 would each extend through a different  
17 one of the upper fastener holes 14 in web member 10 to connect web member 10 to the vertically  
18 extending side of valley truss 16 facing second end 6. Fourth embodiment 32 has the simplest  
19 construction, and would produce the least material waste during manufacture. It is contemplated  
20 for wedge 8 to be manufactured with varying pitch, depending upon the application, and for  
21 fourth embodiment 32 to be made from rigid material, such as steel, plastic, nylon, and have a  
22 substantially uniform thickness. As an alternative to folded construction, a molded embodiment  
23 similar to that shown in Fig. 15 is also considered to be within the scope of the present invention,  
24 and which would preferably have a solid wedge 8, as well as a fastener hole 14 through wedge 8  
25 in a similar position to that shown for fastener 34 in Fig. 19. Although not limited thereto, such a  
26 molded embodiment could be made from plastic material, such as polycarbonate. Fig. 17 shows

1 fourth embodiment 32 connected between a vertically extending piece of construction material  
2 20 with a non-beveled bottom end 22, and the top chord of a standard manufactured wood roof  
3 truss 18, while Fig. 18 shows forth embodiment 32 connected between a non-beveled  
4 horizontally extending bottom chord of a manufactured valley truss 16 and the top chord of a  
5 standard manufactured wood roof truss 18. Although the upper surface 28 of wedge 8 is not  
6 marked in Fig. 17 or Fig. 18 for clarity of illustration, both Figs 17 and 18 show upper wedge  
7 surface 28 positioned entirely under the superimposed construction material, vertically extending  
8 piece of construction material 20 or manufactured valley truss 16, respectively. Fig. 22 shows a  
9 fifth preferred embodiment of the present invention, similar in configuration to that shown in Fig.  
10 15 and having a molded construction.

11 Fig. 20 shows several present invention uplift resistance straps, such as first embodiments  
12 2, each connected between the horizontally extending bottom chord of a manufactured valley  
13 truss 16 and the top chord of a standard roof truss 18. Fig. 21 is a perspective view of two  
14 perpendicularly oriented roof structures having a valley therebetween where the present invention  
15 could be used for uplift resistance. As shown in Fig. 20, the web members 10 of first  
16 embodiments 2 are only secured on the vertically extending side of valley trusses 16 facing the  
17 downwardly extending ends of standard roof trusses 18. It is contemplated that the web members  
18 10 of the second embodiments 24, the third embodiments 26, and the fourth embodiments 32  
19 would also be connected to the sides of valley trusses 16 the downwardly extending ends of  
20 standard roof trusses 18, with the bottommost fastener hole 14b of fourth embodiments 32 being  
21 used with a fastener 34 that extends into the top chord of a supporting standard roof truss 18 and  
22 thereby connects web member 10 and wedge 8 to the supporting standard roof truss 18.  
23